Complete Summary

GUIDELINE TITLE

American Academy of Orthopaedic Surgeons clinical practice guideline on the treatment of carpal tunnel syndrome.

BIBLIOGRAPHIC SOURCE(S)

American Academy of Orthopaedic Surgeons (AAOS). Clinical practice guideline on the treatment of carpal tunnel syndrome. Rosemont (IL): American Academy of Orthopaedic Surgeons (AAOS); 2008 Sep. 76 p. [116 references]

GUIDELINE STATUS

This is the current release of the guideline.

It is anticipated that this guideline will be revised in 2011.

COMPLETE SUMMARY CONTENT

SCOPE
METHODOLOGY - including Rating Scheme and Cost Analysis
RECOMMENDATIONS
EVIDENCE SUPPORTING THE RECOMMENDATIONS
BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
QUALIFYING STATEMENTS
IMPLEMENTATION OF THE GUIDELINE
INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES
IDENTIFYING INFORMATION AND AVAILABILITY
DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Carpal tunnel syndrome

GUIDELINE CATEGORY

Assessment of Therapeutic Effectiveness
Diagnosis
Risk Assessment
Treatment

CLINICAL SPECIALTY

Family Practice
Internal Medicine
Orthopedic Surgery
Physical Medicine and Rehabilitation

INTENDED USERS

Health Care Providers
Health Plans
Managed Care Organizations
Occupational Therapists
Physicians
Public Health Departments

GUIDELINE OBJECTIVE(S)

- To improve patient care by outlining the appropriate information-gathering and decision-making processes involved in managing the treatment of carpal tunnel syndrome
- To be used as an educational tool to guide qualified physicians through a series of treatment decisions in an effort to improve the quality and efficiency of care

TARGET POPULATION

Adults (defined as patients older than 18 years of age) with carpal tunnel syndrome

Note: These recommendations assume that the patient has reversible mechanical compression of the median nerve based on the diagnostic criteria set forth by the American Academy of Orthopaedic Surgeons (AAOS). This does not include patients who have nerve damage characterized by irreversible microscopic damage to the nerve ultra-structure.

INTERVENTIONS AND PRACTICES CONSIDERED

1. Non-operative treatment (with regular monitoring)
    - Local steroid injection
    - Splinting
    - Oral steroids
    - Ultrasound

Note: The following non-operative interventions carry no recommendation for or against their use: activity modifications, acupuncture, cognitive behavioral therapy, cold laser, diuretics, exercise, electric stimulation, fitness, Graston instrument, iontophoresis, laser, stretching, massage therapy, magnet therapy, manipulation, medications (including anticonvulsants, antidepressants and NSAIDs), nutritional supplements, phonophoresis, smoking cessation, systemic steroid injection, therapeutic touch, vitamin B6 (pyridoxine), weight reduction, yoga. Heat therapy is not recommended.

2. Surgical treatment
    - Preoperative antibiotics
    - Carpal tunnel release
    - Complete division of flexor retinaculum

Note: The following surgical interventions carry no recommendation for or against use: flexor retinaculum lengthening, internal neurolysis, tenosynovectomy, ulnar bursa preservation, postoperative rehabilitation. Skin nerve preservation, epineurotomy, and post-operative wrist immobilization are not recommended.

3. Treatment response
    - Boston Carpal Tunnel Questionnaire
    - Disabilities of the arm, should, and hand (DASH)
    - Michigan Hand Outcomes Questionnaire (MHQ)
    - Patient Evaluation Measure (PEM)
    - Short Form (SF)-12 or SF-36 Health Survey

MAJOR OUTCOMES CONSIDERED

- Incidence and prevalence of carpal tunnel syndrome
- Relief of condition
- Permanent sensory loss
- Thenar paralysis
- Remission
- Work productivity
- Functional status
- Quality of life
- Patient satisfaction
- Surgical complications
- Cost

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Hand-searches of Published Literature (Secondary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Literature Searches

An American Academy of Orthopaedic Surgeons (AAOS) Work Group, consisting of eight physician members, with the assistance of the AAOS medical librarian and staff, completed a systematic review of the relevant literature. The authors searched four electronic databases:

- MEDLINE (from 1966 through April 6, 2007)
- EMBASE (from 1966 through April 6, 2007)
- CINAHL database (from 1982 through June 12, 2007)
- The Cochrane Database of Systematic Reviews (through April 6, 2007)

Search strategies were reviewed by the work group prior to conducting the searches. All literature searches were supplemented with manual screening of bibliographies in publications accepted for inclusion into the evidence base. In

addition, the bibliographies of recent review articles were searched for potentially relevant citations. All included articles met the following a priori inclusion/exclusion criteria.

Exclusion Criteria

- Abstracts and unpublished study reports
- Cadaveric, animal or in vitro studies
- Letters, case reports, historical articles, editorials, and commentaries
- Non prospective studies
- Studies where gender is restricted
- Studies where results for carpal tunnel syndrome (CTS) population cannot be separated from results from other populations
- Studies with < 10 patients
- Studies with patients under 18 years of age
- Studies written in languages other than English

Inclusion Criteria

- Studies evaluating a treatment or intervention for CTS
- Studies that measured the validity, reliability, or responsiveness of any assessment instrument
- The following study designs: randomized controlled trials or prospective controlled trials. Where appropriate, observational study designs were also considered (i.e., prospective cohorts, case series, etc.)
- Studies where data can be extracted for statistical analysis
- Studies reporting patient-oriented outcome measures using previously validated instruments
- Studies that diagnose CTS with electro-diagnostic tests, signs and/or symptoms of the syndrome

Databases Searched

The initial search yielded 109 systematic reviews, of which 51 were retrieved and evaluated. Fifty-eight systematic reviews were not retrieved because their titles indicated they reviewed topics that were irrelevant to the recommendations in this guideline. Of the fifty-one retrieved, five systematic reviews met all inclusion criteria. These systematic reviews were updated with controlled trials identified through MEDLINE and EMBASE searches.

The literature searches for recommendations that were not addressed by existing systematic reviews were performed using one or more of the same databases identified previously except through June 12, 2007. A search of the CINAHL database from 1982 through June 12, 2007 was also conducted for Recommendation 9.

All literature searches were supplemented with manual screening of bibliographies in publications accepted for inclusion into the evidence base. In addition, the bibliographies of recent review articles were searched for potentially relevant citations.

Search Strategies

The authors search for systematic reviews using PubMed included the following search strategy, with limits of publication dates 1966 to present, English language, and humans: ("carpal tunnel syndrome"[TIAB] NOT Medline[SB] OR "carpal tunnel syndrome"[MeSH Terms] OR carpal tunnel[Text Word] AND systematic[sb]). The authors search for systematic reviews using EMBASE included the following search strategy with limits of publication dates 1966 to present, English language, and humans: carpal AND tunnel AND ([cochrane review]/lim OR [systematic review]/lim) AND ([humans]/lim AND [embase]/lim).

Refer to Appendix I of the original guideline document or Appendix B of the Evidence Report for additional information on the search strategies utilized.

NUMBER OF SOURCE DOCUMENTS

Ninety-four articles met all *a priori* inclusion criteria.

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence for Primary Research Question[1]

	Types of Studies			
	Therapeutic Studies Investigating the results of treatment	**Prognostic Studies** Investigating the effects of a patient characteristic on the outcome of disease	**Diagnostic Studies** Investigating a diagnostic test	**Economic and Decision Analyse** Developing an economic or decisi model
Level I	• High quality randomized trial (RCT) with statistically significant difference but narrow confidence intervals • Systematic Review[2] of Level I RCTs (and study results were homogenous[3])	• High quality prospective study[4] (all patients were enrolled at the same point in their disease with ≥80% follow-up of enrolled patients) • Systematic review[2] of Level I studies	• Testing of previously developed diagnostic criteria on consecutive patients (with universally applied reference "gold" standard) • Systematic review[2] of Level I studies	• Sensible co and alternatives values obtained fr many studi with multiw sensitivity analyses • Systematic review[2] of Level I stud
Level	• Lesser quality	• Retrospective[6]	• Development of	• Sensible co

Types of Studies				
II	RCT (e.g. <80% follow-up, no blinding, or improper randomization) • Prospective[4] comparative study[5] • Systematic review[2] of Level II studies or Level I studies with inconsistent results	study • Untreated controls from an RCT • Lesser quality prospective study (e.g. patients enrolled at different points in their disease or <80% follow-up) • Systematic review[2] of Level II studies	diagnostic criteria on consecutive patients (with universally applied reference "gold" standard) • Systematic review[2] of Level II studies	and alternatives values obtained fr limited studies; wi multiway sensitivity analyses • Systematic review[2] of Level II studies
Level III	• Case control study[7] • Retrospective[6] comparative study[5] • Systematic review[2] of Level III studies	• Case control study[7]	• Study of non-consecutive patients; without consistently applied reference "gold" standard • Systematic review[2] of Level III studies	• Analyses based on limited alternatives and costs; and poor estimated • Systematic review[2] of Level III studies
Level IV	Case Series[8]	Case Series	• Case-control study • Poor reference standard	Analysis with no sensitivity analyse
Level V	Expert Opinion	Expert Opinion	Expert Opinion	Expert Opinion

1. A complete assessment of quality of individual studies requires critical appraisal of all aspects of the study design.
2. A combination of results from two or more prior studies.
3. Studies provided consistent results.
4. Study was started before the first patient enrolled.
5. Patients treated one way (e.g., cemented hip arthroplasty) compared with a group of patients treated in another way (e.g., uncemented hip arthroplasty) at the same institution.
6. The study was started after the first patient enrolled.
7. Patients identified for the study based on their outcome, called "cases"; e.g., failed total hip arthroplasty, are compared to those who did not have outcome, called "controls"; e.g., successful total hip arthroplasty.
8. Patients treated one way with no comparison group of patients treated in another way.

METHODS USED TO ANALYZE THE EVIDENCE

Meta-Analysis of Randomized Controlled Trials
Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Data Extraction

Six reviewers completed data extraction independently for all studies. Evidence tables were constructed to summarize the best evidence pertaining to each recommendation and all evidence can be found in the accompanying Evidence Report to this guideline (see "Availability of Companion Documents" field).

Assigning a Level of Evidence

The quality of evidence was rated using the evidence hierarchy shown in Appendix III of the original guideline document (see "Rating Scheme for the Strength of the Evidence" field above). A complete description of the hierarchy is included in the AAOS Evidence Report for this guideline (see "Availability of Companion Documents" field).

Types of Outcome Measures

During data extraction of included studies, all reported outcome measures were extracted by the reviewer(s) and included in evidence tables. The reviewer categorized outcomes as subjective or objective, patient oriented or not patient oriented, and validated or not validated. Patient oriented outcomes were given preference in analysis in accordance with current evidenced based medicine methodology. Subjective outcomes were required to have been previously validated to merit analysis.

The most common outcome measures in this review were:

- SSS (Symptom Severity Scale; ≈ 100)
- VAS (Visual Analog Scale; ≈ 100)
- FSS (Functional Status Scale; ≈ 80)
- Symptom related outcome measure (≈ 50)

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Nominal Group Technique)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Process Overview

An American Academy of Orthopaedic Surgeons (AAOS) Work Group, consisting of eight physician members, was assembled specifically for the development of this guideline. The Work Group consisted of a diverse group of physician specialists with expertise in treating patients with carpal tunnel syndrome.

The Work Group, with the assistance of the AAOS staff, began by formulating "simulated recommendations". The simulated recommendations were used to define the scope of the guideline and to refine the literature searches that were conducted.

During the process of developing this guideline, the Work Group participated in a series of conference calls and meetings. When published information of sufficient quality was not available, consensus opinion was employed.

Consensus Development

Voting on guideline recommendations and performance measures were conducted using a modification of the nominal group technique (NGT), a method previously used in guideline development. Briefly each member of the guideline Work Group ranked his or her agreement with a guideline recommendation or performance measure on a scale ranging from 1 to 9 (where 1 is "extremely inappropriate" and 9 is "extremely appropriate"). Consensus was obtained if the number of individuals who did not rate a measure as 7, 8, or 9 is statistically non-significant (as determined using the binomial distribution). Because the number of Work Group members who were allowed to dissent with the recommendation depends on statistical significance, the number of permissible dissenters varies with the size of the work group. The number of permissible dissenters for several work group sizes is given in the table below:

Work Group Size	Number of Permissible Dissenters
$\leq$3	Not allowed. Statistical significance cannot be obtained
4-5	0
6-8	1
9	1 or 2

The NGT was conducted by first having members vote on a given recommendation without discussion. If the number of dissenters was "permissible", the recommendation was adopted without further discussion. If the number of dissenters was not permissible, there was further discussion to see whether the disagreement(s) could be resolved. Three rounds of voting were held to attempt to resolve disagreements. If disagreements were not resolved after three voting rounds, no recommendation was adopted.

Refer also to Appendix E of the Evidence Report (see "Availability of Companion Documents" field) for more information on the assigned grades of recommendation.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Grading the Recommendations

Each guideline recommendation was graded using the following system:

A: Good evidence (Level I Studies with consistent findings) for or against recommending intervention

B: Fair evidence (Level II or III Studies with consistent findings) for or against recommending intervention

C: Poor quality evidence (Level IV or V) for or against recommending intervention

I: There is insufficient or conflicting evidence not allowing a recommendation for or against intervention

The Committee used the following language in constructing the recommendations:

We recommend Treatment X: (for Grade A recommendations)

We suggest Treatment X: (for Grade B recommendations)

Treatment X is an option: (for Grade C recommendations)

These definitions help clarify the intent of the Work Group by reflecting the assessment of the importance of adherence to the recommendation based on the grade of the recommendation.

COST ANALYSIS

The guideline developers reviewed published cost analyses.

As carpal tunnel syndrome (CTS) in the workplace demands attention and as the number of worker's compensation cases are filed increases, the expense for lost productivity and cost of treatment continues to increase. According to the National Institute of Health (NIH), the average lifetime cost of carpal tunnel syndrome, including medical bills and lost time from work, is estimated to be about $30,000 for each injured worker." Hanrahan et al quote similar estimates by the National Council on Compensation Insurance that estimates the average CTS case costs $29,000 in Worker's Compensation benefits and medical costs. The Bureau of Labor Statistics reports, as of 2005, the major industry division with highest number of events and exposures is manufacturing. There were more than 3.8 million visits made to physicians in office-based practices in 2003 because of carpal tunnel syndrome. According to the Burden of Musculoskeletal Diseases in the United States (2008, p.136), the National Health Interview Survey "is believed to underreport the incidence of injuries" and the Bureau of Labor Statistics only report work related data.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Internal Review

The final draft of the guideline was reviewed internally by the American Academy of Orthopaedic Surgeons (AAOS) Board of Directors, Council on Research Quality Assessment and Technology, Board of Councilors, and Board of Specialty Societies (public commentary) and approved by the AAOS Evidence Based Practice Committee, Guideline Oversight and Technology Committee, Council on Research Quality Assessment and Technology, and the Board of Directors.

Advisory Review Panel

Peer review of the draft guideline is completed by an outside Peer Review Advisory Panel. Outside Advisory Panels are convened for each AAOS guideline and consist of experts in the guideline's topic area. These experts represent professional societies other than AAOS and are nominated by the guideline Work Group prior to beginning work on the guideline. Non-editorial comments received from each reviewer are documented, reviewed by the Work Group and approved by the Work Group Chairperson. AAOS staff sends each reviewer the approved documentation for his/her comments. For this guideline, thirteen outside peer review organizations were invited to review the draft guideline and all supporting documentation. Eight societies participated in the review of the Carpal Tunnel Syndrome (CTS) Treatment guideline draft and seven consented to be listed as a peer review organization. One organization requested that the organization name be withheld from publication. The organizations that reviewed the document and consented to publication are listed below:

- The American Academy of Neurology (AAN)
- The American Academy of Physical Medicine and Rehabilitation (AAPMR)
- The American Association of Neurological Surgeons/Congress of Neurological Surgeons (AANS/CNS)
- The American Association of Neuromuscular and Electrodiagnostic Medicine (AANEM)
- The American College of Occupational and Environmental Medicine (ACOEM)
- The American Medical Association (AMA)
- The American Society of Plastic Surgeons (ASPS)

Following response to all reviews, the guideline draft was sent to thirty-one individuals, who were members of the AAOS Board of Directors, Council on Research Quality Assessment and Technology, Board of Councilors, and Board of Specialty Societies for public commentary. Following this period of public commentary, the guideline was submitted for approval.

Documentation of Approval

AAOS Work Group Draft Completed-December 2007

Outside Specialty Review Panel Comments Completed-April 25, 2008

Public Commentary Completed-May 2008

AAOS Guidelines and Technology Oversight Committee-June 11, 2008

AAOS Evidence Based Practice Committee-June 19, 2008

AAOS Council on Research Quality Assessment-July 9, 2008 and Technology

AAOS Board of Directors-September 12, 2008

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions of the levels of evidence (I-V) and grades of recommendation (A-C, I) are provided at the end of the "Major Recommendations" field.

Note from the American Academy of Orthopaedic Surgeons (AAOS): This summary does not contain rationales that explain how and why these recommendations were developed nor does it contain the evidence supporting these recommendations. All readers of this summary are strongly urged to consult the full guideline and evidence report (see "Guideline Availability" and "Availability of Companion Documents" fields) for this information. The guideline developers are confident that those who read the full guideline and evidence report will also see that the recommendations were developed using systematic evidence-based processes designed to combat bias, enhance transparency, and promote reproducibility. This summary of recommendations is not intended to stand alone.

Carpal Tunnel Syndrome (CTS) is among the most common disorders of the upper extremity. It is related to many factors but is thought to be caused by increased pressure on the median nerve in the carpal tunnel at the wrist.

Recommendation 1

A course of non-operative treatment is an option in patients diagnosed with carpal tunnel syndrome. Early surgery is an option when there is clinical evidence of median nerve denervation or the patient elects to proceed directly to surgical treatment. **(Grade C, Level V)**

Recommendation 2

The authors suggest another non-operative treatment or surgery when the current treatment fails to resolve the symptoms within 2 weeks to 7 weeks. **(Grade B, Level I and II)**

Recommendation 3

The authors do not have sufficient evidence to provide specific treatment recommendations for carpal tunnel syndrome when found in association with the following conditions: diabetes mellitus, coexistent cervical radiculopathy, hypothyroidism, polyneuropathy, pregnancy, rheumatoid arthritis, and carpal tunnel syndrome in the workplace. **(Inconclusive, No evidence found)**

Recommendation 4a

Local steroid injection or splinting is suggested when treating patients with carpal tunnel syndrome, before considering surgery. **(Grade B, Level I and II)**

Recommendation 4b

Oral steroids or ultrasound are options when treating patients with carpal tunnel syndrome. **(Grade C, Level II)**

Recommendation 4c

The authors recommend carpal tunnel release as treatment for carpal tunnel syndrome. **(Grade A, Level I)**

Recommendation 4d

Heat therapy is not among the options that should be used to treat patients with carpal tunnel syndrome. **(Grade C, Level II)**

Recommendation 4e

The following treatments carry no recommendation for or against their use: activity modifications, acupuncture, cognitive behavioral therapy, cold laser, diuretics, exercise, electric stimulation, fitness, Graston instrument, iontophoresis, laser, stretching, massage therapy, magnet therapy, manipulation, medications (including anticonvulsants, antidepressants and NSAIDs), nutritional supplements, phonophoresis, smoking cessation, systemic steroid injection, therapeutic touch, vitamin B6 (pyridoxine), weight reduction, yoga. **(Inconclusive, Level II and V)**

Recommendation 5

The authors recommend surgical treatment of carpal tunnel syndrome by complete division of the flexor retinaculum regardless of the specific surgical technique. **(Grade A, Level I and II)**

Recommendation 6

The authors suggest that surgeons do not routinely use the following procedures when performing carpal tunnel release:

- Skin nerve preservation **(Grade B, Level I)**
- Epineurotomy **(Grade C, Level II)**

The following procedures carry no recommendation for or against use: flexor retinaculum lengthening, internal neurolysis, tenosynovectomy, ulnar bursa preservation. **(Inconclusive, Level II and V)**

Recommendation 7

The physician has the option of prescribing pre-operative antibiotics for carpal tunnel surgery. **(Grade C, Level III)**

Recommendation 8

The authors suggest that the wrist not be immobilized postoperatively after routine carpal tunnel surgery. **(Grade B, Level II)**

The authors make no recommendation for or against the use of postoperative rehabilitation. **(Inconclusive, Level II)**

Recommendation 9

The authors suggest physicians use one or more of the following instruments when assessing patients' responses to CTS treatment for research:

- Boston Carpal Tunnel Questionnaire (disease-specific)
- DASH – Disabilities of the arm, shoulder, and hand (region-specific; upper limb)
- MHQ – Michigan Hand Outcomes Questionnaire (region-specific; hand/wrist)
- PEM – Patient Evaluation Measure (region-specific; hand)
- SF-12 or SF-36 Short Form Health Survey (generic; physical health component for global health impact) **(Grade B, Level I, II, and III)**

Definitions:

Levels of Evidence for Primary Research Question[1]

	Types of Studies			
	Therapeutic Studies Investigating the results of treatment	**Prognostic Studies** Investigating the effects of a patient characteristic on the outcome of disease	**Diagnostic Studies** Investigating a diagnostic test	**Economic and Decision Analyse** Developing an economic or decisi model
Level I	• High quality randomized trial (RCT) with statistically significant difference but narrow confidence intervals • Systematic Review[2] of Level I RCTs (and study results were homogenous[3])	• High quality prospective study[4] (all patients were enrolled at the same point in their disease with ≥80% follow-up of enrolled patients) • Systematic review[2] of Level I studies	• Testing of previously developed diagnostic criteria on consecutive patients (with universally applied reference "gold" standard) • Systematic review[2] of Level I studies	• Sensible co and alternatives values obtained fr many studi with multiw sensitivity analyses • Systematic review[2] of Level I stud
Level II	• Lesser quality RCT (e.g. <80% follow-up, no	• Retrospective[6] study • Untreated	• Development of diagnostic criteria on	• Sensible co and alternatives

Types of Studies				
	blinding, or improper randomization) • Prospective[4] comparative study[5] • Systematic review[2] of Level II studies or Level I studies with inconsistent results	controls from an RCT • Lesser quality prospective study (e.g. patients enrolled at different points in their disease or <80% follow-up) • Systematic review[2] of Level II studies	consecutive patients (with universally applied reference "gold" standard) • Systematic review[2] of Level II studies	values obtained fr limited studies; wit multiway sensitivity analyses • Systematic review² of Level II studies
Level III	• Case control study[7] • Retrospective[6] comparative study[5] • Systematic review[2] of Level III studies	• Case control study[7]	• Study of non-consecutive patients; without consistently applied reference "gold" standard • Systematic review[2] of Level III studies	• Analyses based on limited alternatives and costs; and poor estimated • Systematic review[2] of Level III studies
Level IV	Case Series[8]	Case Series	• Case-control study • Poor reference standard	Analysis with no sensitivity analyse
Level V	Expert Opinion	Expert Opinion	Expert Opinion	Expert Opinion

1. A complete assessment of quality of individual studies requires critical appraisal of all aspects of the study design.
2. A combination of results from two or more prior studies.
3. Studies provided consistent results.
4. Study was started before the first patient enrolled.
5. Patients treated one way (e.g., cemented hip arthroplasty) compared with a group of patients treated in another way (e.g., uncemented hip arthroplasty) at the same institution.
6. The study was started after the first patient enrolled.
7. Patients identified for the study based on their outcome, called "cases"; e.g., failed total hip arthroplasty, are compared to those who did not have outcome, called "controls"; e.g., successful total hip arthroplasty.
8. Patients treated one way with no comparison group of patients treated in another way.

Grading the Recommendations

A: Good evidence (Level I Studies with consistent findings) for or against recommending intervention.

B: Fair evidence (Level II or III Studies with consistent findings) for or against recommending intervention.

C: Poor quality evidence (Level IV or V) for or against recommending intervention.

I: There is insufficient or conflicting evidence not allowing a recommendation for or against intervention.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is specifically stated for each recommendation (see the "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Appropriate treatment of patients with carpal tunnel syndrome (CTS)
- Improved quality and efficiency of care of patients with CTS

POTENTIAL HARMS

- Untreated or ill-treated carpal tunnel syndrome (CTS) may worsen and progress to permanent sensory loss and thenar paralysis in some cases.
- Patients with more or prolonged CTS, however defined, may not benefit from prolonged, non-operative treatment.
- Infection is a potential complication of surgical intervention.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- This guideline should not be construed as including all proper methods of care or excluding methods of care reasonably directed to obtaining the same results. The ultimate judgment regarding any specific procedure or treatment must be made in light of all circumstances presented by the patient and the needs and resources particular to the locality or institution. Further, the patient must be an active participant in treatment decisions. All treatment for carpal tunnel syndrome (CTS) is based on the assumption that final decisions are predicated on patient and physician mutual communication about available treatment alternatives and procedures applicable to the individual patient. These decisions include an evaluation of the patient's current quality

of life with CTS. Patients will present with considerable variability in acceptable choices, needs, and access to non-operative alternatives. It is understood that after the patient has been informed of available alternative non-operative therapies and has discussed these options with their physician, the informed patient choice may be to go directly to surgery.

- This Clinical Practice Guideline was developed by an American Academy of Orthopaedic Surgeons (AAOS) physician volunteer Work Group based on a systematic review of the current scientific and clinical information and accepted approaches to treatment and/or diagnosis. This Clinical Practice Guideline is not intended to be a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. Clinical patients may not necessarily be the same as those found in a clinical trial. Patient care and treatment should always be based on a clinician's independent medical judgment, given the individual patient's clinical circumstances.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Quick Reference Guides/Physician Guides

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American Academy of Orthopaedic Surgeons (AAOS). Clinical practice guideline on the treatment of carpal tunnel syndrome. Rosemont (IL): American Academy of Orthopaedic Surgeons (AAOS); 2008 Sep. 76 p. [116 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2008 Sep

GUIDELINE DEVELOPER(S)

American Academy of Orthopaedic Surgeons - Medical Specialty Society

SOURCE(S) OF FUNDING

American Academy of Orthopaedic Surgeons

GUIDELINE COMMITTEE

Work Group Panel

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Panel Members: Michael Warren Keith, MD (*Chair*) Orthopaedic Hand Surgeon; Victoria Masear, MD (*Co-Chair*) Orthopaedic Hand Surgeon; Kevin Chung, MD, University of Michigan Medical Center, Plastic and Reconstructive Surgery; Peter C Amadio, MD, Mayo Clinic, Orthopaedic Hand Surgeon; Michael Andary, MD, Michigan State University, Physical Medicine and Rehabilitation Neurology; Richard W. Barth, MD, AAOS Board of Councilors, Orthopaedic Hand Surgeon; Kent Maupin, MD, Orthopaedic Surgery; Brent Graham MD, University of Toronto, Orthopaedic Hand Surgeon/Microsurgery

Guidelines Oversight Chair: William C. Watters III, MD, Orthopaedic Spine Surgeon

American Academy of Orthopaedic Surgeons (AAOS) Staff: Charles M. Turkelson, PhD, AAOS Research Director; Robert H. Haralson III, MD, MBA, AAOS Medical Director, Orthopaedic Surgeon; Janet L. Wies, MPH, Clinical Practice Guideline Mgr

American Academy of Orthopaedic Surgeons (AAOS) Research Analysts: Kevin Boyer, Lead Analyst; Andrew Chang, MPH; Erica Smith, MPH

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

All panel members gave full disclosure of conflicts of interest prior to voting on the recommendations contained within these guidelines. These guidelines were funded exclusively by the American Academy of Orthopaedic Surgeons who received no funding from outside commercial sources to support the development of this document.

All members of the physician Work Group disclosed any conflicts of interest prior to the development of the recommendations for this guideline. Conflicts of interest are disclosed in writing with the American Academy of Orthopaedic Surgeons via a

private on-line reporting database and also verbally at the recommendation approval meeting. No member of the carpal tunnel syndrome (CTS) Work Group disclosed a conflict of interest for this guideline.

GUIDELINE STATUS

This is the current release of the guideline.

It is anticipated that this guideline will be revised in 2011.

GUIDELINE AVAILABILITY

Electronic copies: Available from the American Academy of Orthopaedic Surgeons Web site.

Print copies: Available from the American Academy of Orthopaedic Surgeons, 6300 North River Road, Rosemont, IL 60018-4262. Telephone: (800) 626-6726 (800 346-AAOS); Fax: (847) 823-8125; Web site: www.aaos.org.

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- Treatment of carpal tunnel syndrome. Summary of recommendations. Rosemont (IL): American Academy of Orthopaedic Surgeons; 2008. 3 p. Electronic copies: Available in Portable Document Format (PDF) from the American Academy of Orthopaedic Surgeons Web site.
- Treatment of carpal tunnel syndrome. Evidence report. Rosemont (IL): American Academy of Orthopaedic Surgeons; 2008. 188 p. Electronic copies: Available in Portable Document Format (PDF) from the American Academy of Orthopaedic Surgeons Web site.
- Systematic reviews and meta-analyses of carpal tunnel syndrome treatments. Rosemont (IL): American Academy of Orthopaedic Surgeons; 2008. 236 p. Electronic copies: Available in Portable Document Format (PDF) from the American Academy of Orthopaedic Surgeons Web site.

Print copies: Available from the American Academy of Orthopaedic Surgeons, 6300 North River Road, Rosemont, IL 60018-4262. Telephone: (800) 626-6726 (800 346-AAOS); Fax: (847) 823-8125; Web site: www.aaos.org.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI Institute on December 26, 2008. The information was verified by the guideline developer on January 15, 2009.

COPYRIGHT STATEMENT

This NGC summary is based on the original guideline, which is subject to the guideline developer's copyright restrictions. For more information, please contact AAOS Department of Research and Scientific Affairs, 6300 North River Road, Rosemont, IL 60018; Phone: (847) 823-7186; Fax: (847) 823-8125.

DISCLAIMER

NGC DISCLAIMER

The National Guideline Clearinghouse™ (NGC) does not develop, produce, approve, or endorse the guidelines represented on this site.

All guidelines summarized by NGC and hosted on our site are produced under the auspices of medical specialty societies, relevant professional associations, public or private organizations, other government agencies, health care organizations or plans, and similar entities.

Guidelines represented on the NGC Web site are submitted by guideline developers, and are screened solely to determine that they meet the NGC Inclusion Criteria which may be found at http://www.guideline.gov/about/inclusion.aspx .

NGC, AHRQ, and its contractor ECRI Institute make no warranties concerning the content or clinical efficacy or effectiveness of the clinical practice guidelines and related materials represented on this site. Moreover, the views and opinions of developers or authors of guidelines represented on this site do not necessarily state or reflect those of NGC, AHRQ, or its contractor ECRI Institute, and inclusion or hosting of guidelines in NGC may not be used for advertising or commercial endorsement purposes.

Readers with questions regarding guideline content are directed to contact the guideline developer.

Date Modified: 2/9/2009